1. An evaporator for a heat transfer system, the evaporator comprising:

a heated wall;

a liquid barrier wall containing working fluid on an inner side of the liquid barrier wall, which fluid flows only along the inner side of the liquid barrier wall;

a primary wick positioned between the heated wall and the inner side of the liquid barrier wall;

a vapor removal channel that is located at an interface between the primary wick and the heated wall; and

a liquid flow channel located between the liquid barrier wall and the primary wick.

2. The evaporator of claim 1 further comprising additional vapor removal channels located at the interface between the primary wick and the heated wall.

3. The evaporator of claim 1 further comprising additional liquid flow channels located between the liquid barrier wall and the primary wick.

4. The evaporator of claim 1 wherein the primary wick, the heated wall, and the liquid barrier wall are planar.

5. The evaporator of claim 1 wherein the primary wick has a thermal conductivity that is low enough to reduce leakage of heat from the heated wall, through the primary wick, toward the liquid barrier wall.

6. The evaporator of claim 1 wherein the heated wall is defined so as to accommodate the vapor removal channel.

7. The evaporator of claim 6 wherein the vapor removal channel is electro-etched into the heated wall.

8. The evaporator of claim 6 wherein the vapor removal channel is machined into the heated wall.

9. The evaporator of claim 1 wherein the interface at the primary wick is defined so as to accommodate the vapor removal channel.

10. The evaporator of claim 9 wherein the vapor removal channel is electro-etched into the heated wall.

11. The evaporator of claim 9 wherein the vapor removal channel is machined into the heated wall.

12. The evaporator of claim 9 wherein the vapor removal channel is embedded within the primary wick at the interface.

13. The evaporator of claim 1 wherein a cross section of the vapor removal channel is sufficient to ensure vapor flow generated at the interface between the primary wick and the heated wall without a significant pressure drop.

14. The evaporator of claim 1 wherein the surface contact between the heated wall and the primary wick is selected to provide better heat transfer from a heat source at the heated wall into the vapor removal channel.

15. The evaporator of claim 1 wherein a thickness of the heated wall is selected to ensure sufficient vaporization at the interface between the primary wick and the heated wall.

16. The evaporator of claim 1 wherein the liquid flow channel supplies the primary wick with liquid from a liquid inlet.

17. The evaporator of claim 16 wherein the liquid flow channel is configured to supply the primary wick with enough liquid to offset liquid vaporized at the interface between the primary wick and the heated wall and liquid vaporized at the liquid barrier wall.

18. The evaporator of claim 1 further comprising:

additional vapor removal channels located at the interface between the primary wick and the heated wall; and

additional liquid flow channels located between the liquid barrier wall and the primary wick;

wherein the number of vapor removal channels is higher than the number of liquid flow channels.

19. The evaporator of claim 1 further comprising:

a secondary wick between the vapor removal channel and the primary wick; and

a vapor vent channel at an interface between the secondary wick and the primary wick.

20. The evaporator of claim 20 wherein vapor bubbles formed within the vapor vent channel are swept through the secondary wick and through the liquid flow channel.

21. The evaporator of claim 19 wherein the vapor vent channel delivers vapor that has vaporized within the primary wick near the liquid barrier wall away from the primary wick.

22. The evaporator of claim 19 wherein the secondary wick is a mesh screen.

23. The evaporator of claim 19 wherein the secondary wick is a slab wick.

24. The evaporator of claim 1 wherein the heated wall and the liquid barrier wall are capable of withstanding internal pressure of the working fluid.

25. The evaporator of claim 1 wherein the primary wick, the heated wall, and the liquid barrier wall are annular and coaxial such that the heated wall is inside the primary wick, which is inside the liquid barrier wall.

26. The evaporator of claim 1 wherein the vapor removal channel is thermally segregated from the liquid flow channel.

27. The evaporator of claim 1 wherein the liquid barrier wall is equipped with fins that cool a liquid side of the evaporator.

28. The evaporator of claim 1 wherein the liquid barrier wall is cooled by passing liquid across an outer surface of the liquid barrier wall.

29. A heat transfer system comprising:

an evaporator including:

a heated wall;

a liquid barrier wall containing working fluid on an inner side of the liquid barrier wall, which fluid flows only along the inner side of the liquid barrier wall;

a primary wick positioned between the heated wall and the inner side of the liquid barrier wall;

a vapor removal channel that is located at an interface between the primary wick and the heated wall, the vapor removal channel extending to a vapor outlet; and

a liquid flow channel located between the liquid barrier wall and the primary wick, the liquid flow channel receiving liquid from a liquid inlet;

a condenser having a vapor inlet and a liquid outlet;

a vapor line providing fluid communication between the vapor outlet and the vapor inlet; and

a liquid return line providing fluid communication between the liquid outlet and the liquid inlet.

30. The heat transfer system of claim 29 wherein the liquid barrier wall of the evaporator is equipped with heat exchange fins.

31. The heat transfer system of claim 29 further comprising a reservoir in the liquid return line.

32. The heat transfer system of claim 31 wherein the evaporator comprises:

a secondary wick between the vapor removal channel and the primary wick; and

a vapor vent channel at an interface between the secondary wick and the primary wick.

33. The heat transfer system of claim 32 wherein vapor bubbles formed within the vapor vent channel are swept through the secondary wick, through the liquid flow channel, and into the reservoir.

34. The heat transfer system of claim 32 wherein the vapor vent channel delivers vapor that has vaporized within the primary wick near the liquid barrier wall away from the primary wick and into the reservoir.

35. The heat transfer system of claim 31 wherein vapor bubbles are vented into the reservoir from the evaporator.

36. The heat transfer system of claim 31 wherein the reservoir is cold biased.

37. The heat transfer system of claim 29 wherein the evaporator is planar.

38. The heat transfer system of claim 29 wherein the evaporator is annular such that the heated wall is inside the primary wick, which is inside the liquid barrier wall.

39. The heat transfer system of claim 29 wherein liquid returning into the evaporator from the condenser is subcooled by the condenser.

40. The heat transfer system of claim 39 wherein an amount of subcooling produced by the condenser balances heat leakage through the primary wick.

41. The heat transfer system of claim 39 further comprising a reservoir in the liquid return line.

42. The heat transfer system of claim 41 wherein subcooling maintains a thermal balance within the reservoir.

43. The heat transfer system of claim 41 wherein the liquid return line enters the evaporator through the reservoir.

44. The heat transfer system of claim 41 wherein the reservoir is formed adjacent the liquid barrier wall of the evaporator.

45. The heat transfer system of claim 41 wherein the reservoir is formed between the liquid barrier wall and the primary wick of the evaporator.

46. The heat transfer system of claim 41 wherein the reservoir is formed as a separate vessel that communicates with the liquid inlet of the evaporator.

47. The heat transfer system of claim 41 wherein the reservoir is equipped with fins that cool the reservoir.

48. The heat transfer system of claim 41 wherein a temperature difference between the reservoir and the primary wick near the heated wall ensures circulation of the working fluid through the heat transfer system.

49. The heat transfer system of claim 29 wherein the heated wall contacts a hot side of a Stirling cooling machine.

50. The heat transfer system of claim 29 wherein the liquid flow channel is fed with liquid from a reservoir located above the primary wick.

51. The heat transfer system of claim 50 wherein the liquid barrier wall is cold biased.